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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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EXAMINER
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/758,547	CHARNY ET AL.
	Examiner	Art Unit	
	DeWanda Samuel	2616	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>14 January 2004</u>.

2a)☐ This action is **FINAL.**   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle,* 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-19</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-19</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on <u>14 January 2004</u> is/are: a)☒ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date <u>14 October 2004</u>.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 112

1.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly
> claiming the subject matter which the applicant regards as his invention.

2.   **Claims 4 and 16** are rejected under 35 U.S.C. 112, second paragraph, as being

indefinite for failing to particularly point out and distinctly claim the subject matter which

applicant regards as the invention.

3.   **With regard to claim 4 and 16,** the limitation "to a node within said selected

priority sub-tree associated with said transmitted priority packet". Need more clarity.

Claim Rejections - 35 USC § 101

4.   **Claims 7-18** are rejected under 35 U.S.C. 101 because the claimed invention is

directed to non-statutory subject matter. The language of the claim raises a question as

to whether the claim is directed merely to an abstract idea that is not tied to a

technological art, environment or machine which would result in a practical application

producing a concrete, useful, and tangible result to form the basis of statutory subject

mater under 35 U.S.C. 101.

Claims 7-18, claims the non-statutory subject matter of a program. Data

structures not claimed as embodied in computer-readable subject media are descriptive

material per se and are not statutory because they are not capable of causing functional

change in the computer. See, e.g. Warmerdam, 33 F.3d at 1361, 31 USPQ2d at 1754

(claim to a data structure per se held nonstatutory). Therefore, since the claimed

programs are not tangibly embodied in a physical medium, encoded on a computer-

readable medium and clearly recited as a computer program then the Applicants has

not complied with 35 U.S.C 101.

Claim Rejections - 35 USC § 103

5.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6.   The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148

USPQ 459 (1966), that are applied for establishing a background for determining

obviousness under 35 U.S.C. 103(a) are summarized as follows:

1.   Determining the scope and contents of the prior art.
2.   Ascertaining the differences between the prior art and the claims at issue.
3.   Resolving the level of ordinary skill in the pertinent art.
4.   Considering objective evidence present in the application indicating obviousness or nonobviousness.

7.   **Claims 1 and 7** are rejected under 35 U.S.C. 103(a) as being unpatentable over

Bennett ("Hierarchical Packet Fair Queuing Algorithms", 1997) in view of Levy et al. (PG

Pub 2003/0179703).

     With regard to claim 1, Bennett discloses having a *scheduling method for a*

multi-level class hierarchy wherein classes are represented as nodes, Bennett discloses having a hierarchical packet fair queuing algorithms (title).

said method comprising: selecting non-priority nodes of said unified tree to establish a non-priority sub-tree; Bennett discloses having a link sharing example that shows a best-effort node ("non-priority node") part of a tree (page 1 fig.1).

selecting priority nodes of said unified tree to establish one or more priority sub-trees corresponding to one or more priority levels; Bennett discloses having a link sharing example that shows a real-time ("priority sub-tree") part of a tree (page 1 fig.1).

if and only if queues of nodes of said priority sub-trees are empty, applying a first scheduling algorithm to said non-priority sub-tree to select a packet for transmission; Bennett discloses having a link sharing example that shows a real-time ("priority sub-tree") and best-effort node ("non-priority sub-tree") as a part of a tree (page 1 fig.1)...designed to use hierarchical packet fair queuing algorithms ("scheduling algorithm", title). Bennett further discloses having a root of H-GPS has two children A and B with service shares... node A has two child leaf nodes A1 and A2...at time 0 A1 has an empty queue (page 678 line 28-33). However, Bennett does not explicitly disclose if queues of nodes of said priority sub-trees are empty, applying a first scheduling algorithm to said non-priority sub-tree to select a packet for transmission. Levy et al. discloses that there are numerous known algorithms that can be employed to make a packet selection...an algorithm can be used that always select a packet from

the highest from the highest priority non-empty queue. Another algorithm might

modulate this approach with selecting packets from lower priority packets...(page 4

paragraph 39 line 6-19). It is inferred that a scheduling algorithm can be configured to

select a packet according to the criteria.

Therefore it would have been obvious to one having ordinary skill in the art at the

time of the invention was made to have hierarchical packet fair queuing algorithm

("scheduling algorithm", title) as taught by Bennett configured to select packets with low

priority as taught by Levy et al. to prevent a delay in transmitting a packets if the desired

transport of higher priority packets in queues are empty.

and if any of said one or more priority sub-trees are non-empty, selecting a priority

packet from said one or more priority sub-trees for transmission. Bennett discloses

having a link sharing example that shows a real-time ("priority sub-tree") as a part of a

tree (page 1 fig.1)...designed to use hierarchical packet fair queuing algorithms

("scheduling algorithm", title). However, Bennett does not explicitly disclose if any of

said one or more priority sub-trees are non-empty, selecting a priority packet from said

one or more priority sub-trees for transmission. Levy et al. discloses there a re

numerous known algorithm that can be employed to make a packet selection...an

algorithm can be used that always select a packet from the highest from the highest

priority non-empty queue. Another algorithm might modulate this approach with

selecting packets from lower priority packets...(page 4 paragraph 39 line 6-19). It is

inferred that a scheduling algorithm can be configured to select a packet according to

the criteria.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to have hierarchical packet fair queuing algorithm ("scheduling algorithm", title) as taught by Bennett configured to select packets with higher priority as taught by Levy et al. to provide a packet processing technique that will process high priority packets in a fast and efficient manner.

With regard to claim 7, Bennett discloses having a *computer program product for scheduling a multi-level class hierarchy wherein classes are represented as nodes,* Bennett discloses having a hierarchical packet Fair queuing algorithms (title).

said product comprising: code that causes selection of non-priority nodes of said unified tree to establish a non-priority sub-tree; Bennett discloses having a link sharing example that shows a best-effort node ("non-priority node") part of a tree (page 1 fig.1).

code that causes selection of priority nodes of said unified tree to establish one or more priority sub-trees corresponding to one or more priority levels; Bennett discloses having a link sharing example that shows a real-time ("priority sub-tree") part of a tree (page 1 fig.1).

code that, if and only if queues of nodes of said priority sub-trees are empty, causes application of a first scheduling algorithm to said non-priority sub-tree to select a packet for transmission; Bennett discloses having a link sharing example that shows a real-time ("priority sub-tree") and best-effort node ("non-priority sub-tree") as a part of a tree

(page 1 fig.1)...designed to use hierarchical packet fair queuing algorithms ("scheduling algorithm", title). Bennett further discloses having a root of H-GPS has two children A and B with service shares... node A has two child leaf nodes A1 and A2...at time 0 A1 has an empty queue (page 678 line 28-33). However, Bennett does not explicitly disclose if queues of nodes of said priority sub-trees are empty, applying a first scheduling algorithm to said non-priority sub-tree to select a packet for transmission. Levy et al. discloses that there are numerous known algorithms that can be employed to make a packet selection...an algorithm can be used that always select a packet from the highest from the highest priority non-empty queue. Another algorithm might modulate this approach with selecting packets from lower priority packets...(page 4 paragraph 39 line 6-19). It is inferred that a scheduling algorithm can be configured to select a packet according to the criteria.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to have hierarchical packet fair queuing algorithm ("scheduling algorithm", title) as taught by Bennett configured to select packets with low priority as taught by Levy et al. to prevent a delay in transmitting a packets if the desired transport of higher priority packets in queues are empty.

code that, if any of said one or more priority sub-trees are non-empty, causes selection of a priority packet from said one or more priority sub-trees for transmission; Bennett discloses having a link sharing example that shows a real-time ("priority sub-tree") as a part of a tree (page 1 fig.1)...designed to use hierarchical packet fair queuing algorithms

("scheduling algorithm", title). However, Bennett does not explicitly disclose if any of said one or more priority sub-trees are non-empty, selecting a priority packet from said one or more priority sub-trees for transmission. Levy et al. discloses there a re numerous known algorithm that can be employed to make a packet selection…an algorithm can be used that always select a packet from the highest from the highest priority non-empty queue. Another algorithm might modulate this approach with selecting packets from lower priority packets…(page 4 paragraph 39 line 6-19). It is inferred that a scheduling algorithm can be configured to select a packet according to the criteria.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to have hierarchical packet fair queuing algorithm ("scheduling algorithm", title) as taught by Bennett configured to select packets with higher priority as taught by Levy et al. to provide a packet processing technique that will process high priority packets in a fast and efficient manner.

and a computer-readable medium that stores the codes. Bennett discloses having a hierarchical packet fair queuing algorithms ("code", title). It is inferred that the algorithm must be stored on a computer-readable medium type device in order to execute the functional steps.

8.   **Claims 2, 6, 8 and 12** are rejected under 35 U.S.C. 103(a) as being

unpatentable over Bennett ("Hierarchical Packet Fair Queuing Algorithms", 1997) and

Levy et al. (PG Pub 2003/0179703) as applied to claim 1 above, and further in view of

Ali et al. (US 7,006,513).

With regard to claim 2, in combination Bennett and Levy et al. teaches the

scheduling method recited in claim 1.*wherein selecting a packet from said one or more*

priority sub-trees for transmission comprises: selecting a highest priority non-empty sub-

tree from said one or more priority sub-trees; Bennett discloses having a link sharing

example that shows a real-time ("priority sub-tree") part of a tree (page 1 fig.1).

However, Bennett does not explicitly disclose selecting a packet from said one or more

priority sub-trees for transmission comprises: selecting a highest priority non-empty sub-

tree from said one or more priority sub-trees. Ali et al. discloses having a packet

selection technique within a scheduler (column 3 line 45-67)...the packets from multiple

flows are stored in the egress queues 350-360 located at leaf level 345 of the hierarchy

390. The scheduler selects one packet from the egress queues 350-360 using a

selection process...the packets in the egress queues 355 and 360 may have higher

priority than packets in the egress queue 350 and therefore, may be selected prior to

the packets in the egress queue 350 (column 4 line 3-31).

Therefore it would have been obvious to one having ordinary skill in the art at the

time of the invention was made to have real-time ("priority sub-tree") as taught by

Bennett being selected by a packet selection technique according its higher priority as
taught by Ali et al. to prevent delay sensitive packets from being discarded.

and applying a second scheduling algorithm to said highest priority non-empty sub-tree
to select a priority packet for transmission. Bennett discloses having hierarchical packet
fair queuing algorithms (title)... also discloses having real-time ("priority sub-tree" fig. 1).
It is inferred that the scheduling algorithms can be used independently according to the
priority of the node.

With regard to claim 6, in combination Bennett, Levy et al. and Ali et al.
teaches the scheduling method in claim 2. *Wherein updating said scheduling state*
comprises: adding a length of said selected priority packet to a length of a next
transmitted packet associated with said identified node to be used in making further
scheduling decisions within said non-priority sub-tree. Bennett discloses when a packet
arrives at a leaf node I, if session I's logical queue for its parent node Qi is not empty,
the packet is just appended to the end of the physical FIFO queue for the session (
page 679 line 13-15).

With regard to claim 8, in combination Bennett and Levy et al. teaches the
scheduling method recited in claim 7.*Wherein said code that causes selection of a*
packet from said one or more priority sub-trees for transmission comprises:
 code that causes selection of a highest priority non-empty sub-tree from said one or
more priority sub-trees; Bennett discloses having a link sharing example that shows a

real-time ("priority sub-tree") part of a tree (page 1 fig.1). However, Bennett does not

explicitly disclose selecting a packet from said one or more priority sub-trees for

transmission comprises: selecting a highest priority non-empty sub-tree from said one

or more priority sub-trees. Ali et al. discloses having a packet selection technique within

a scheduler (column 3 line 45-67)...the packets from multiple flows are stored in the

egress queues 350-360 located at leaf level 345 of the hierarchy 390. The scheduler

selects one packet from the egress queues 350-360 using a selection process...the

packets in the egress queues 355 and 360 may have higher priority than packets in the

egress queue 350 and therefore, may be selected prior to the packets in the egress

queue 350 (column 4 line 3-31).

Therefore it would have been obvious to one having ordinary skill in the art at the

time of the invention was made to have real-time ("priority sub-tree") as taught by

Bennett being selected by a packet selection technique according its higher priority as

taught by Ali et al. to prevent delay sensitive packets from being discarded.

and code that causes application of a second scheduling algorithm to said highest

priority non-empty sub-tree to select a priority packet for transmission. Bennett

discloses having hierarchical packet fair queuing algorithms (title)...also discloses

having real-time ("priority sub-tree" fig. 1). It is inferred that the scheduling algorithms

can be used independently according to the priority of the node.

With regard to claim 12, in combination Bennett, Levy et al. and Ali et al.

teaches the scheduling method in claim 10. *Wherein said code that causes updating of*

said scheduling state comprises: code that causes addition of a length of said selected

priority packet to a length of a next transmitted packet associated with said identified

node to be used in making further scheduling decisions within said non-priority sub-tree.

Bennett discloses when a packet arrives at a leaf node I, if session I's logical queue for

its parent node Qi is not empty, the packet is just appended to the end of the physical

FIFO queue for the session (page 679 line 13-15).

9.   **Claims 3-5 and 9-11** are rejected under 35 U.S.C. 103(a) as being unpatentable

over Bennett ("Hierarchical Packet Fair Queuing Algorithms", 1997) and Levy et al. (PG

Pub 2003/0179703) and Ali et al. (US 7,006,513) as applied to claim 2 above, and

further in view of Li et al. (US Patent 6,560,230).

With regard to claim 3, in combination Bennett, Levy et al., and Ali et al.

teaches the scheduling method in claim 2. *Further comprising: updating scheduling*

state within said non-priority sub-tree to reflect transmission of said priority packet.

Bennett discloses having best-effort sub-tree ("non-priority sub-tree) and real-time

("priority"). However, Bennett does not discloses having updating scheduling state

within said non-priority sub-tree to reflect transmission of said priority packet. Li et al.

discloses having packet scheduling methods and apparatus (title). More specifically, li et

al. discloses having a leaf scheduling engines 16D and 160G corresponds to real-time

classes ("priority"). The other leaf scheduling engines corresponds to best effort classes

("non-priority sub-tree")... scheduling engines 160K could pass a newly arrived high

priority packet in place of an already selected lower priority packet. The virtual time V at

scheduling engine 160K (e.g. leaf scheduling engines corresponds to best effort classes) updated after the high priority packet is sent (column 14 line 44-62).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to have a best-effort sub-tree ("non-priority sub-tree) as taught by Bennett with a scheduling engines 160K updating the virtual time V after transmission of high priority packet is sent as taught by Li et al. to provide a technique that will inform best-effort sub-tree ("non-priority sub-tree) the packets that are currently in the shared bandwidth.

With regard to claim 4, in combination Bennett, Levy et al., Ali et al., and Li et al. teaches the scheduling method in claim 3. *Wherein updating comprises: identifying a node within said non-priority sub-tree that has a parent relationship, as viewed in said multi-level class hierarchy, to a node within said selected priority sub-tree associated with said transmitted priority packet;* Bennett discloses in fig. 1 discloses having a multi-level class hierarchy with a sub-tree with a parent...also, for any node n, let p(n) and child(n) denote its parent node and set of child nodes, respectively ("non-priority sub-tree that has a parent relationship, as viewed in said multi-level class hierarchy", page 677 column 2 paragraph B line 9-11). Bennett further discloses having a root with two children A and B...node A has two child leaf nodes A1 and A2...A1 is empty and A2 has many packets queued (page 678 line 26-32). It is inferred that node A has a known association with children A1 and A2 within the tree.

and updating a scheduling state of said identified node and ancestor nodes of said

identified node within said non-priority sub-tree. Bennett discloses having a hierarchical

server, these packets may belong to sessions that share an ancestor node ("ancestor

node") with session... for a session i with H ancestors in an H-PFQ server... p(i) is used

to represent its parent node ("identified node", page 682 line 7-25). However, Bennett

does not explicitly discloses updating a scheduling state. Li et al. discloses a selected

packet will be passed to the parent ("identified node") of the leaf scheduling engine 60

("ancestor node", step 122). At that time the virtual time V of the leaf scheduling engine

60 will be updated... (column 11 line 55-63).

Therefore it would have been obvious to one having ordinary skill in the art at the

time of the invention was made to have a parent node ("identified node) and a ancestor

node ("ancestor node") as taught by Bennett with a scheduling engines 160K updating

the virtual time V after transmission of high priority packet is sent as taught by Li et al. to

provide a technique that will inform best-effort sub-tree ("non-priority sub-tree) the

packets that are currently in the shared bandwidth.

With regard to claim 5, in combination Bennett, Levy et al., Ali et al., and Li et

al. teaches the scheduling method in claim 4. *Wherein identifying comprises: employing*

a pointer to said identified node. Bennett discloses having a pointers identifying the next

leaf node to send a packet (page 679 line 6-33). It is inferred that defined variables in

the algorithm points to the identified node.

With regard to claim 9, in combination Bennett, Levy et al., and Ali et al.

teaches the scheduling method in claim 8. *further comprising: code that causes*

updating of scheduling state within said non-priority sub-tree to reflect transmission of

said priority packet. Bennett discloses having best-effort sub-tree ("non-priority sub-tree)

and real-time ("priority"). However, Bennett does not discloses having updating

scheduling state within said non-priority sub-tree to reflect transmission of said priority

packet. Li et al. discloses having packet scheduling methods and apparatus (title). More

specifically, Bennett discloses having a leaf scheduling engines 16D and 160G

corresponds to real-time classes ("priority"). The other leaf scheduling engines

corresponds to best effort classes ("non-priority sub-tree")... scheduling engines 160K

could pass a newly arrived high priority packet in place of an already selected lower

priority packet. The virtual time V at scheduling engine 160K (e.g. leaf scheduling

engines corresponds to best effort classes) updated after the high priority packet is

sent (column 14 line 44-62).

Therefore it would have been obvious to one having ordinary skill in the art at the

time of the invention was made to have a best-effort sub-tree ("non-priority sub-tree) as

taught by Bennett with a scheduling engines 160K updating the virtual time V after

transmission of high priority packet is sent as taught by Li et al. to provide a technique

that will inform best-effort sub-tree ("non-priority sub-tree) the packets that are currently

in the shared bandwidth.

With regard to claim 10, in combination Bennett, Levy et al., Ali et al., and Li et al. teaches the scheduling method in claim 9. *Wherein said code that causes updating comprises: code that causes identification of a node within said non-priority sub-tree that has a parent relationship, as viewed in said multi-level class hierarchy, to a node within said selected priority sub-tree associated with said transmitted priority packet;* Bennett discloses in fig. 1 discloses having a multi-level class hierarchy with a sub-tree with a parent... also, for any node n, let p(n) and child(n) denote its parent node and set of child nodes, respectively ("non-priority sub-tree that has a parent relationship, as viewed in said multi-level class hierarchy", page 677 column 2 paragraph B line 9-11). Bennett further discloses having a root with two children A and B... node A has two child leaf nodes A1 and A2... A1 is empty and A2 has many packets queued (page 678 line 26-32). It is inferred that node A has a known association with children A1 and A2 within the tree.

and code that causes updating of scheduling state of said identified node and ancestor nodes of said identified node within said non-priority sub-tree. Bennett discloses having a hierarchical server, these packets may belong to sessions that share an ancestor node ("ancestor node") with session... for a session i with H ancestors in an H-PFQ server... p(i) is used to represent its parent node ("identified node", page 682 line 7-25). However, Bennett does not explicitly discloses updating a scheduling state. Li et al. discloses a selected packet will be passed to the parent ("identified node") of the leaf scheduling engine 60 ("ancestor node", step 122). At that time the virtual time V of the leaf scheduling engine 60 will be updated... (column 11 line 55-63).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to have a parent node ("identified node) and a ancestor node ("ancestor node") as taught by Bennett with a scheduling engines 160K updating the virtual time V after transmission of high priority packet is sent as taught by Li et al. to provide a technique that will inform best-effort sub-tree ("non-priority sub-tree) the packets that are currently in the shared bandwidth.

With regard to claim 11, in combination Bennett, Levy et al., Ali et al., and Li et al. teaches the scheduling method in claim 10. *Wherein said code that causes identification comprises: code that causes employment of a pointer to said identified node.* . Bennett discloses having a pointers identifying the next leaf node to send a packet (page 679 line 6-33). It is inferred that defined variables in the algorithm points to the identified node.

10. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over Levy et al. (PG PUB 2003/0179703) in view of Bennett ("Hierarchical Packet F air Queuing Algorithm" 1997).

With regard to claim 13, Levy et al. discloses having an *apparatus for scheduling a multi-level class hierarchy wherein classes are represented as nodes, said apparatus comprising: a processor; and a memory storing instructions for execution by said processor, said instructions comprising;* Levy et al. discloses having a network

router 200 ("apparatus")...controller 80 ("processor")...configuration file ("memory" page

2 paragraph 22 line 1-16).)... a scheduler for scheduling a packets of a multi-level class

hierarchy (fig. 2)

code that causes selection of non-priority nodes of said unified tree to establish a non-

priority sub-tree; Levy disclose having in fig. 2 a policy manger 220 that divided

information into different classes... class 9 ("non-priority nodes") is the class that gets

the least attention (fig.2 and page 6 paragraph 82 line 4-5).

code that causes selection of priority nodes of said unified tree to establish one or more

priority sub-trees corresponding to one or more priority levels; Levy disclose having in

fig. 2 a policy manger 220 that divided information into different classes... class 1, is

the class that gets the most attention (fig. 2 and page 6 paragraph 82 line 4-5).

code that, if and only if queues of nodes of said priority sub-trees are empty, causes

application of a first scheduling algorithm to said non-priority sub-tree to select a packet

for transmission; Levy et al. discloses that there are numerous known algorithms that

can be employed to make a packet selection...an algorithm can be used that always

select a packet from the highest from the highest priority non-empty queue. Another

algorithm might modulate this approach with selecting packets from lower priority

packets...(page 4 paragraph 39 line 6-19). It is inferred that a scheduling algorithm can

be configured to select a packet according to the criteria. However, Levy et al. does not

disclose if and only if queues of nodes of said priority sub-trees are empty causes

application of a first scheduling algorithm to said non-priority sub-tree to select a packet

for transmission. Bennett discloses having a link sharing example that shows a real-time

("priority sub-tree") and best-effort node ("non-priority sub-tree") as a part of a tree

(page 1 fig.1)...designed to use hierarchical packet fair queuing algorithms ("scheduling

algorithm", title). Bennett further discloses having a root of H-GPS has two children A

and B with service shares... node A has two child leaf nodes A1 and A2...at time 0 A1

has an empty queue (page 678 line 28-33).

Therefore it would have been obvious to one having ordinary skill in the art at the

time of the invention was made to have configured schedule algorithms to select

packets with low priority as taught by Levy et al. implementing a hierarchical packet fair

queuing algorithm ("scheduling algorithm", title) as taught by Bennett to prevent a delay

in transmitting of packets if priority in queues are empty.

and code that, if any of said one or more priority sub-trees are non-empty, causes

selection of a priority packet from said one or more priority sub-trees for transmission. ;

Levy et al. discloses that there are numerous known algorithms that can be employed to

make a packet selection...an algorithm can be used that always select a packet from

the highest from the highest priority non-empty queue. Another algorithm might

modulate this approach with selecting packets from lower priority packets...(page 4

paragraph 39 line 6-19). It is inferred that a scheduling algorithm can be configured to

select a packet according to the criteria. However, Levy et al. does not disclose if and

only if queues of nodes of said priority sub-trees are empty causes application of a first

scheduling algorithm to said non-priority sub-tree to select a packet for transmission.

Bennett discloses having a link sharing example that shows a real-time ("priority sub-

tree") and best-effort node ("non-priority sub-tree") as a part of a tree (page 1

fig.1)...designed to use hierarchical packet fair queuing algorithms ("scheduling

algorithm", title). Bennett further discloses having a root of H-GPS has two children A

and B with service shares... node A has two child leaf nodes A1 and A2...at time 0 A1

has an empty queue (page 678 line 28-33).

Therefore it would have been obvious to one having ordinary skill in the art at the

time of the invention was made to have configured schedule algorithms to select

packets with low priority as taught by Levy et al. implementing a hierarchical packet fair

queuing algorithm ("scheduling algorithm", title) as taught by Bennett to prevent a delay

in transmitting of packets if priority in queues are empty.

11. **Claim 14** is rejected under 35 U.S.C. 103(a) as being unpatentable over Levy et

al. (PG PUB 2003/0179703) in view of Bennett ("Hierarchical Packet F air Queuing

Algorithm" 1997) as applied to claim 13 above, and further in view of Ali et al. (US

Patent 7,006,513).

With regard to claim 14, in combination Levy et al. and Bennett teaches the

apparatus recited in claim 13. *Wherein said code that causes selection of a packet from*

said one or more priority sub-trees for transmission comprises:

code that causes selection of a highest priority non-empty sub-tree from said one or

more priority sub-trees or more priority sub-trees. Levy et al. discloses a having in fig. 2

different class nodes... class 1 gets the most attention (page 6 paragraph 82 line 3-8).

However, Levy does not explicitly discloses selecting the highest priority non-empty

sub-tree from said one or more priority sub-trees or more priority sub-trees. Ali et al.

discloses having a packet selection technique within a scheduler (column 3 line 45-

67)... the packets from multiple flows are stored in the egress queues 350-360 located

at leaf level 345 of the hierarchy 390. The scheduler selects one packet from the egress

queues 350-360 using a selection process...the packets in the egress queues 355 and

360 may have higher priority than packets in the egress queue 350 and therefore, may

be selected prior to the packets in the egress queue 350 (column 4 line 3-31).

Therefore it would have been obvious to one having ordinary skill in the art at the

time of the invention was made to have class 1 node ("priority sub-tree") as taught by

Levy et al. being selected by a packet selection technique according its higher priority

as taught by Ali et al. to prevent delay sensitive packets from being discarded.

and code that causes application of a second scheduling algorithm to said highest

priority non-empty sub-tree to select a priority packet for transmission ; Levy et al.

discloses a having in fig. 2 different class nodes... class 1 gets the most attention (page

6 paragraph 82 line 3-8). However, Levy does not explicitly discloses selecting the

highest priority non-empty sub-tree from said one or more priority sub-trees or more

priority sub-trees. However, Levy et al. does not explicitly disclose having an application

of a second scheduling algorithm to said highest priority non-empty sub-tree to select a

priority packet for transmission. Ali et al. discloses having a packet selection technique within a scheduler (column 3 line 45-67)...the packets from multiple flows are stored in the egress queues 350-360 located at leaf level 345 of the hierarchy 390. The scheduler selects one packet from the egress queues 350-360 using a selection process...the packets in the egress queues 355 and 360 may have higher priority than packets in the egress queue 350 and therefore, may be selected prior to the packets in the egress queue 350 (column 4 line 3-31).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to have class 1 node ("priority sub-tree") as taught by Levy et al. being selected by a packet selection technique according its higher priority as taught by Ali et al. to prevent delay sensitive packets from being discarded.

12.   **Claims 15-18** are rejected under 35 U.S.C. 103(a) as being unpatentable over Levy et al. (PG PUB 2003/0179703) and Bennett ("Hierarchical Packet F air Queuing Algorithm" 1997) and Ali et al. (US Patent 7,006,513) as applied to claim 13 and 14 above, and further in view of Li et al. (US Patent 6,560,230).

With regard to claim 15, in combination Levy et al, Bennett, and Ali et al. teaches the apparatus recited in claim 14.*wherein said instructions further comprise: code that causes updating of scheduling state within said non-priority sub-tree to, effect transmission of said priority packet.* Levy et al. discloses a having in fig. 2 different class nodes... class 9 that get the least attention ("non-priority sub-tree", page 6

paragraph 82 line 3-8). However, Levy et al. does not disclose code that causes updating of scheduling state within said non-priority sub-tree to, effect transmission of said priority packet. Li et al. discloses having packet scheduling methods and apparatus (title). More specifically, li et al. discloses having a leaf scheduling engines 16D and 160G corresponds to real-time classes ("priority"). The other leaf scheduling engines corresponds to best effort classes ("non-priority sub-tree")... scheduling engines 160K could pass a newly arrived high priority packet in place of an already selected lower priority packet. The virtual time V at scheduling engine 160K (e.g. leaf scheduling engines corresponds to best effort classes) updated after the high priority packet is sent (column 14 line 44-62).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to have a class 9 node ("non-priority sub-tree) as taught by Levy et al. with a scheduling engines 160K updating the virtual time V after transmission of high priority packet is sent as taught by Li et al. to provide a technique that will inform best-effort sub-tree ("non-priority sub-tree) the packets that are currently in the shared bandwidth.

With regard to claim 16, in combination Levy et al. , Bennett, Ali et al. and Li et al. teaches the apparatus recited in claim 15.*Wherein said code that causes updating comprises:*

code that causes identification of a node within said non-priority sub-tree that has parent relationship, as viewed in said multi-level class hierarchy, to a node within said selected

priority sub-tree associated with said transmitted priority packet; Levy et al. discloses in

fig. 2 the relationship between nodes of different classes of a multi-level class hierarchy.

code that causes updating of scheduling state of said identified node and ancestor

lodes of said identified node within said non-priority sub-tree. Levy discloses having

nodes in fig. 2. However, Levy does not disclose having updating of scheduling state of

said identified node and ancestor lodes of said identified node within said non-priority

sub-tree. Li et al. discloses a selected packet will be passed to the parent ("identified

node") of the leaf scheduling engine 60 ("ancestor node", step 122). At that time the

virtual time V of the leaf scheduling engine 60 will be updated...(column 11 line 55-63).

Therefore it would have been obvious to one having ordinary skill in the art at the

time of the invention was made to have a nodes as taught by Levy et al. with a

scheduling engines 160K updating the virtual time V after transmission of high priority

packet is sent as taught by Li et al. to provide a technique that will inform best-effort

sub-tree ("non-priority sub-tree) the packets that are currently in the shared bandwidth.

With regard to claim 17, in combination Levy et al., Bennett, Ali et al. and Li et

al. teaches the apparatus recited in claim 16.*wherein said code that causes updating*

comprises: code that causes employment of a pointer to said identified node. Bennett

discloses having a pointers identifying the next leaf node to send a packet (page 679

line 6-33). It is inferred that defined variables in the algorithm points to the identified

node.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to have a nodes as taught by Levy et al. identified by pointers as taught by Bennett to provide a mechanism that will a properly link nodes within a tree structure.

With regard to claim 18, in combination Levy et al. Ali et al. and Li et al. teaches the apparatus recited in claim 16. *Wherein said code that causes updating of said scheduling state comprises: code that causes addition of a length of said selected priority packet to a length of a next transmitted packet associated with said identified node to be used in making further scheduling decisions within said non-priority sub-tree.* Levy et al. discloses having packets within a queue. However, Levy et al. does not disclose addition of a length of said selected priority packet to a length of a next transmitted packet associated with said identified node to be used in making further scheduling decisions within said non-priority sub-tree. Bennett discloses when a packet arrives at a leaf node I, if session i logical queue for its parent node Qi is not empty, the packet is just appended to the end of the physical FIFO queue for the session (page 679 line 13-15).

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to have a packets with a queue as taught by Levy et al. appended by another to the end of the physical FIFO queue as taught by Bennett to provide a mechanism that will seamlessly transport priority packets.

13. **Claim 19** is rejected under 35 U.S.C. 103(a) as being unpatentable over Li et al

(US patent 6,560,230) in view of Ali et al. (US Patent 7,006,513).

With regard to claim 19, Li et al. discloses having an *apparatus for scheduling a*

multi-level class hierarchy wherein classes are represented as nodes, Li et al. discloses

having a enterprise service point (ESP) with a scheduler 50 fig. 5 and fig. 2)...for

scheduling multi-level class hierarchy (fig.7)...also the nodes of the policy tree may be

called classes (column 7 line 21-22).

said apparatus comprising: means for selecting non-priority nodes of said unified tree

to establish a non- priority sub-tree; Li et al. discloses having a packets vie nodes may

have one of two priority levels. Each may have high priority (real-time) or low priority

(best effort, "non-priority nodes", column 13 line 35-41 and fig. 5A).

means for selecting priority nodes of said unified tree to establish one or more priority

sub-trees corresponding to one or more priority levels; Li et al. discloses in fig. 5A

having a real-time node ("priority node").

means for, if and only if queues of nodes of said priority sub-trees are empty, applying a

first scheduling algorithm to said non-priority sub-tree to select a packet for

transmission; Li et al. discloses having in fig 5A a packet being placed in a empty

queue 55 of a real-time node ("queue of priority node of the priority sub-tree").

However, Li et al. does not explicitly discloses applying a first scheduling algorithm to

said non-priority sub-tree to select a packet for transmission. Ali et al. discloses having

a method of selecting packets... the scheduler selects one packet from the egress

queues 350-360 using a packet selection process... the scheduler may also select

packets based on other criteria...egress queues 350-360 may be divided by traffic classes. For example, the egress queues 350 may be a first-in-first-out (FIFO) queue storing packets associated with best effort (BE) flows ("non-priority sub-tree"). It is inferred that the packet selection process can be outlined any requirements that are needed for the process.

Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention was made to have a real-time node ("queue of priority node of the priority sub-tree") empty queue 55 as taught by Li et al. with a packet selection process as taught by Ali et al. packet processing technique that will process packets in a fast and efficient manner.

and means for, if any of said one or more priority sub-trees are non-empty, selecting a priority packet from said one or more priority sub-trees for transmission. Li et al. discloses in fig. 5A having a non-empty queue 55 of a real-time node ("priority node" column 10 line 41-51). Li et al. further discloses leaf scheduler 60 extracts packets from queues 55 and forward those packets ...(column 10 line 54-55).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DeWanda Samuel whose telephone number is (571) 270-1213. The examiner can normally be reached on Monday- Thursday 8:30-5:30 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Q. Ngo can be reached on (571) 272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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6/21/2007

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